

SAA09FT01-012  
B/L: 510.00  
SYS: BRODERSON  
8-1/2 TON  
CRANE

JAN 23 1995

Critical Item: Planetary Gear Winch Assembly (1 item)

Find Number: 0-280-00125

Criticality Category: 1

SAA No: 09FT01-012

System/Area: 8-1/2 Ton Broderon Mobile  
Crane/LOA

NASA

Part No: None

PMN/ K61-0261

Name: 8-1/2 Ton Broderon Mobile Crane

Mfg/ Gear Products Inc.

Part No: PG-110 Series

Drawing/ IC-80-1B

Sheet No: 63-64

Function: Transfers torque from the Planetary Gear Winch Motor to the Winch Drum.

Critical Failure Mode/Failure Mode No: Gears disengage/09FT01-012.002

Failure Causes: Structural Failure of Gears and Gearbox Housing.

Failure Effect: Torque for holding load will be lost. Load suspended from hook will drop. Possible loss of life or vehicle. The worst case of criticality applies because of plans to use the Crane to lift flight hardware and/or GSE containing hazardous materials (e.g., the hydrazine cart at the launch pad, contingency.)

### Acceptance Rationale

#### Design:

- o The gearbox is an off-the-shelf item manufactured by Gear Products Incorporated. The design is based on American Gear Manufacturers Association (AGMA) standard 420.04 "Practice for Enclosed Speed Reducers or Increaseers Using Spur, Helical, Herringbone, and Spiral Bevel Gears".
- o The gears are splined to shafts or integrally machined and are retained in place by shoulders within the confines of the gearcase.
- o Vendor load charts are provided with the mobile crane specifying load, reeving, boom angle, and boom extension to prevent exceeding stability or encroaching on crane/winch structural limits.

*Attachment  
5050234FE  
Sheet 5 of 8*

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**Planetary Gear Winch Assembly (Continued)**

- The winch has a designed safety factor of 2:1 based on yield strength and approximately 3.33:1 based on ultimate strength at a rated line pull of 10,000 lbs.
- The maximum allowable line pull (per the load charts) is 9000 lbs. (single part reeving). The line pull at full rated load is 8500 lbs. (two-part reeving). This results in operational safety factors of approximately 3.7:1 and 3.9:1 respectively in these load conditions.
- When handling the SRB Hydrazine carts (1200 lbs.) the operational safety factor is approximately 33.33:1 based on yield strength and 55.56:1 based on ultimate strength (two-part reeving).

**Test**

- Oil sample testing is performed annually by ferrography. The results are returned to System Engineering for review and is documented in the crane log book.
- Heavy equipment ensures proper operation of Winch Gear Assembly on a semi-annual basis per PMI HBJ. A pre-operational checklist is completed by OMI Q3205 prior to commencement of lifting operations.
- OMRSD File VI requires annual performance of a rated load test to verify system integrity.
- The mobile crane is load tested annually per PMI L20 with a load equal to the rated load at the minimum radius in accordance with the manufacturer's load chart.

**Inspection:** The Planetary Gear Winch Assembly is inspected semi-annually in accordance with PMI-HBJ for:

- a. damage, corrosion control
- b. oil leakage
- c. loose fasteners
- d. extensive corrosion/deterioration of metal and paint respectively
- e. structural defects
- f. excessive dirt

*Attachment  
5050234FE  
sheet 6 of 8*

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Failure History:

- o The PRACA database was queried and no failure data was found against this component.
- o The GIDEP failure data interchange system has been researched and no failures of this component were found.

Operational Use:

- o Correcting Action:  
There is no action which can be taken to mitigate the failure effect.
- o Timeframe:  
Since no correcting action is available, timeframe does not apply.

*Attachment  
5050239FE  
Sheet 7 of 8*